PRESCRIBED HERBIVORY FOR VEGETATION TREATMENT PROJECTS

1/15/15 Draft by RMAC

OVERVIEW

This document has been produced by the Range Management Advisory Committee (RMAC) to raise awareness of the use of prescribed herbivory amongst CAL-FIRE Vegetation Management Program (VMP) Foresters and others contemplating fuel reduction projects consistent with the Vegetation Treatment Program Environmental Impact Report (VTP EIR). The VTP EIR contemplates using a combination of prescribed fire, mechanical treatments, manual treatments, prescribed herbivory, and herbicides to strategically reduce hazardous fuel loading within the State Responsibility Area (SRA). The information included in this document should aid the VMP Foresters in identifying environmental conditions where prescribed herbivory may be the best treatment alternative in terms of cost and environmental impact to achieve the fuel reduction objectives.

Prescribed herbivory as envisioned under the VTP EIR is the intentional use of domestic livestock to remove, rearrange or convert vegetation on wildlands to reduce the costs and losses associated with wildfires and to enhance the condition of forests, rangelands, and watersheds. The types of domestic livestock considered include cattle, horses, sheep and goats, with sheep and goats being the favored animals for VTP projects because of their grazing and browsing habits, and their relative ease of transport. Combinations of these animals can be effective in creating fuel breaks in grass and shrub fuel types, and maintaining fuel breaks in grass, shrub and timber fuel types. Effective use of livestock requires the appropriate combination of animals, stocking rates, and timing.

Determining the goal, objective, mission or purpose of the user is critical in evaluating the potential use of prescribed herbivory, also referred to as “targeted grazing/browsing”.

SITE EVALUATION

Several characteristics and parameters of the site must be evaluated prior to designing a grazing/browsing management plan including, but not limited to, the following:

- **Infrastructure**

  Moving herbivores to the site requires trucks and trailers. Once onsite, water and containment to the desired vegetation must be addressed.

  - Roads: Transportation of herbivores generally is by tractor trailer or pick-up truck with trailer, depending on the number of head. It is important to note if your site has an adequate turn-a-round and loading/unloading area to facilitate large truck traffic. This does not have to be directly at the project site as the animals can be moved moderate distances on foot to the project area. Also note if there are access roads throughout the project area, and if the loading area will be different than the unloading area.

- Water: All herbivores require water on site. This can be from an on-site stock pond, a water supply line to a portable water trough, or can be shipped in by truck. All available water sources in the general project vicinity should be identified during project development.
- Containment: Herbivores will need to be contained to the project boundaries. Controlling animal movement helps control the intensity and duration of grazing in the project area, is necessary to protect off-site sensitive resources, and to protect the herbivores themselves from predators. This will generally involve some combination of fencing, guard and herd dogs, and potentially, an on-site herder. Portable fencing is a common tool for contract grazing, but any existing fences or barriers to animal movement should be identified.

- **Vegetation Characteristics**

Prescribed herbivory should be considered when the targeted vegetation to be removed or modified is grass, forbs or shrubs. Herbivores may also be appropriate in forested vegetation types when the targeted vegetation is shrubs and brush, such as in fuel break maintenance. Vegetation characteristics to evaluate include species composition, height, diameter, and density.

- Species Composition: Will aid the contract grazer in identifying the appropriate animal for the job. Any noxious weeds on site should also be identified. This information may also help dictate the timing of grazing to when the vegetation is most palatable and any noxious weeds are unlikely to be spread.
- Height: Goats can browse only as high as they can get their mouth when standing on their hind legs, or about 7 feet. Any vegetation higher than this is unlikely to be adequately grazed to meet the fuel reduction goals of the project.
- Diameter: Goats can browse shrub and tree stems up to approximately 1 inch diameter. Material of greater diameter will likely be left on site, denuded of any smaller stems, branches and leaves.
- Density: The relative density of the vegetation to be removed or modified will aid in determining the number of animals necessary for the job and the length of time to complete it.

- **Environmental Characteristics**

Herbivores have the potential to damage other resources if their movement is not closely controlled. Potential environmental resources of concern are watercourses, sensitive wildlife habitat, cultural resources, and any desirable vegetation to be left on-site. Special consideration may also need to be provided to neighbors when developing a prescribed herbivory project. Sensitive resources need to be identified and mitigation measures developed for their protection during project development. Any identified sensitive areas should be clearly marked in the field and identified on any project maps. The protection measures need to be included in the vegetation treatment plan and clearly communicated to the herder and project manager, including a pre operational field visit when appropriate.

- **Scale**

The size of the project and the amount of vegetation to be removed will have a strong influence on the economics of prescribed herbivory projects. As with mechanical treatments, the move in and set up costs are fixed regardless of project size. Herbivores also become more productive once they are familiar with the vegetative characteristics of the site. Larger projects will likely result in bids that are cheaper per acre or per animal day than smaller projects. That said, small projects may still be competitive with other vegetation treatment methods, so don't let the size of the project discourage the use of herbivores. Please see the discussion of cost structure in the contracting section below for further discussion of this topic.

ANIMAL CHARACTERISTICS

Generally animals can be divided into two (2) categories – i.e., grazers and browsers – however each category may overlap significantly depending on species, stage of growth, availability of forage, animal genetics, or previous training of animals. Horses, cattle and sheep fall into the category of "grazers", and tend to prefer the bulk cellulose of grasses and forbs. Goats fall into the broad category of "browsers", and tend to feed on more readily digestible leaves and shoots of brush and trees within their reach. All these animals have a limited ability to shift among these feeding strategies.

Browsing multiple species (usually goats and sheep) together on the same site can be very effective for fuel reduction projects, particularly when your target vegetation is a combination of grass, forbs, and shrubs. Taking advantage of the dietary preferences of each herbivore can result in a more complete fuel reduction project. Grazing animals such as sheep will consume the grass and forbs, while browsing animals such as goats will consume the more woody material within their reach (about 7 feet tall). There is not a typical mob size for multi-species systems, however one herder can handle up to 1500 head of goats and sheep. The ratio of grazers to browsers can be tailored to the targeted vegetation to be removed.

Consumption per day of both grazers and browsers can be calculated by the following rules of thumb: Goats will eat approximately 3% of their body weight per day of the dry matter weight of the forage being consumed. Sheep, horses and cattle will eat approximately 2% of their body weight in dry matter per day. So, taking a 100 lb goat as an example and a rough estimate of 25% dry matter of green growing brush, the goat would consume approximately 12 lb of green brush per day. So, if you want to remove one ton (2,000 lb) of brush per day from a specified area, it would take approximately one hundred seventy (170) 100 lb goats to accomplish your goal. By calculating the amount of biomass you want to remove you can estimate the mob size (# of animals) and length of the foraging period to get the job done. (These "rules of thumb" will help you as you move to the contracting portion of this paper.)

Forage species being targeted for herbivory may not always provide a nutritionally adequate diet for the animals. Energy, mineral, or protein supplements may be required to maintain animal health and productivity. Toxic plants can be a challenge particularly with sheep. Goats seem to be resistant to most serious toxins but may limit their intake of scrub or forbs depending on the time of year or

elevations. The contract grazer will be able to identify any special constraints on your site and may be able to suggest project timing (seasonal) that will best meet your objectives.

ADVANTAGES AND BENEFITS

Prescribed herbivory can offer a variety of benefits in comparison to other proposed vegetation treatments included in the VTP EIR.

Herbivory is a historic, natural way of removing biomass, and can yield a quality protein product for commercial benefit. Herbivores are essentially a "biological masticator" that can reproduce themselves, and turn unwanted biomass into a consumable product while at the same time increase soil organic matter, sequester carbon, and minimize greenhouse gases (GHG).

Consider using domestic livestock in your project when the following concerns arise:

- Air quality, when compared to the use of prescribed fire.
- Noise, when compared to mechanical and some manual treatments.
- Proximity to structures, when compared to risks of using prescribed fire or mechanical treatments.
- Steep slopes, when compared to prescribed fire, manual, or mechanical treatments.
- Soil compaction and surface disturbance, when compared to mechanical treatments.
- Noxious weed control, when compared to manual or mechanical treatments.

LIMITATIONS

There may be environmental or social constraints that make prescribed herbivory an inappropriate treatment to consider, including, but not limited to, the following:

- Treatment of large amounts of dead woody fuels and slash.
- Timing of treatment in relation to size and maturity of the biomass.
- Goats may eat the bark of some tree species, which may kill the tree by girdling.
- Animals need shelter during wet weather accompanied by freezing or near-freezing temperatures.
- Will only remove 1 and 10 hour fuels (those less than about one inch). Further treatment will be necessary if there are larger materials to be treated.

BEST MANAGEMENT PRACTICES

Things to consider when designing a prescribed herbivory project to minimize or mitigate potential environmental or social impacts:

- Identify and establish appropriate buffer zones around environmentally sensitive areas such as riparian zones, sensitive plants, threatened or endangered animal habitat and archaeological resources.

- To prevent introduction of seeds from undesirable plant species to the site, the herd should be fed weed free diet for three days prior to being introduced to the grazing site. Any supplemental feed brought on site shall be certified "weed free".
- Post signs warning public of danger of electric fences and unleashed guard dogs when the project area is open to the public. Discuss public interactions with the on-site hearder and grazing project manager.
- Use the highest appropriate stocking density to achieve uniform utilization of the targeted vegetation.
- Conduct appropriate public outreach so that the public will understand your project objectives. Even though the use of animals as "biological masticators" has a long history, the practice was largely set aside when machinery and fuel became available and cheap a generation ago. The general public will be very interested in what you are doing. A well designed public relations program will help you bridge the gap between the public and bureaucratic institutions.
- Confirm that the contract grazer has a well thought-out animal care procedures in place to ensure the animals are cared for in a responsible, humane fashion (ample stock watering, safety from predators, and careful animal observation for sickness or disease).
- Consultation with Certified Range Managers (CRM) when appropriate.
- Develop a monitoring program that determines the effectiveness of the grazing/browsing program compared to the original planned results.

CONTRACTING

The following key points should be addressed in a contract with a prescribed grazer. A sample contract and Request for Proposals (RFP) are included in the appendix of this document for further guidance on this subject.

- **Finding the right Contract Grazing Operator for your project**

There are a number of contract grazing outfits performing targeted grazing for specific purposes (ex. fire reduction), most often using some combination of goats and sheep. The size and scale of these operators varies, from smaller operations using only a few dozen goats to commercial operation of upwards of 2,000 head performing year-round grazing services. Determining the scale of your project through acreage and targeted vegetation type and quantity will help you determine the best contract grazer for your project. Often a Request for Proposal (RFP) or Request for Quote (RFQ) defining the project location and scope is announced to the general public and contract grazers are able to provide a bid or quote on the project (see Appendix A for an example RFP). Through this process CAL FIRE can determine which operator may be the best fit for the project.

A list of contract grazers can be found on-line through the links provided at the end of this document. Please take note that these are not the sole operators performing these services. It is recommended that you contact other organizations within your region who use prescribed grazing as a management tool to find active contract grazers in your area. Some organizations to check with are your local Resource Conservation District (RCD), Fire Safe Council (FSC), or local city and county public works departments.

- **Site Assessment**

Before a contract grazer is able to develop a quote and scope of work for a project, it is common for a tour of the site(s) that are being proposed for grazing. This allows the contract grazer to assess a variety of factors which help to determine what is needed to appropriately perform the job. Such as: number of head, species and ratio if more than one species is proposed to be used, water access points, fencing type, vegetation and density, slope of terrain and truck and trailer access, as well as camp trailer sites if the project requires an on-site herder. Allowing invitation for proposed contract grazing operators to become familiar with the site will allow for the most accurate cost quote and approach to achieving your goals using herbivores for mastication of fire hazardous vegetation.

- **Cost Structures**

The acreage, duration, time of year and the complexity of factors to perform the grazing service are taken into consideration when contract grazers develop their quotes. There are two general types of determination of cost for contract grazing services. The first cost structure is quoting the service fee by placing a charge per head per day. For example, there are 500 head of goats proposed to graze, a contract grazing operator might charge 50 cents per head per day. If the project is to consist of 30 days, the quote would be $7,500 (500 goats x $0.50/day x 30 days). It is to be made clear that the transportation costs are either folded into the cost per head per day, or is to be included as a separate, additional cost.

The second cost structure, common in areas grazed around urban and suburban peripheries, is a service fee per acre grazed for a proposed project. Again, it needs to be stipulated whether transportation costs are included in the per acre costs or if it is to be included as a separate, additional cost. Smaller acreage often is of greater cost per acre than broad acreage, typically due to the transportation and impact on animal performance. Also to be taken into account are the factors mentioned under "Site Assessment" above which help contract grazing operators determine complexity and needs to perform each project. Prices for contract grazing services will vary by region and project, however industry standard in 2014 in the urban periphery of the Bay Area can range from $600-$1,000 an acre for the service of targeted grazing for fire hazard reduction and/or stewardship goals. Most of these parcels being grazed are less than 100 acres and generally are in the range of 5-20 acres.

The highest demand months for contract grazers tend to be on the tail-end of the growing season through the late summer months, and sometimes early fall, depending on annual rainfall. This also varies from region to region. During those heightened demand months, contract grazers often charge a premium for their services. Conversely, during off-season months of fall and winter, service fees may be found to be less as the demand for contract grazing services is reduced during this time of year.

- **The Contract**

Public agencies within the state of California have been using contract grazing for more than a decade and detailed contracts have been developed to address the needs and concerns of both the agency and the contractor. The contract generally stipulates insurance qualifications, labor details, grazing schedules and terms of an annual or multiple year contract. Please inquire with local or regional public agencies known to use contract grazing as a vegetation management tool for sample contracts common in your area. A sample contract is included in Appendix B of this document as an example of the general items that should be covered in a prescribed grazing contract.

References:

Prescribed Grazer Contacts:

California wool Growers Association
http://www.woolgrowers.org/targeted_grazing/producer.html Accesses 8/22/14

Livestock for Landscapes
http://www.livestockforlandscapes.com/network.htm

Some Agencies that use Prescribed Grazing:

East Bay Regional Parks District
City of San Francisco
City of Oakland
City of Lincoln
City of Rocklin
San Mateo County Parks and Recreation
Santa Clara County Parks and Recreation

Prescribed Grazing Resources:

American Sheep Association. Targeted Grazing: A Natural approach to Vegetation Management and Landscape Enhancement – A Handbook on Grazing as an Ecological Service. American Sheep Association, 2006.
http://www.woolgrowers.org/targeted_grazing/handbook.html Accessed 8/22/14.

Navaez, Nelmy. Prescribed Herbivory to Reduce Fuel Load in California Chaparral. University of California, Davis. ProQuest, 2007. PhD Dissertation.

Roger S. Ingram, Morgan P. Doran and Glenn Nader (2013). Planned Herbivory in the Management of Wildfire Fuels, Herbivory, Dr. Breno Barros (Ed.), ISBN: 978-953-51-1052-1, InTech, DOI: 10.5772/48673. Available from: http://www.intechopen.com/books/herbivory/planned-herbivory-in-the-management-of-wildfire-fuels

Appendixes:

A. Sample Request for Proposal for Contract Grazing Services
B. Example Contract for Contract Grazing Services

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